

Steps to Sustainability



Kentucky Army National Guard's Energy Initiatives

Jayson McDonald, EIT



Kentucky Army National Guard

KYARNG Energy Management Team

- **COL Steve King**, Construction & Facility Management Officer
- **Joe Sanderson**, DMA Director of Facilities
- **CPT Kenny Staley**, Facilities Manager
- **Will Phillips PE, EMIT**, Energy Manager II
- **Jayson McDonald EIT**, Energy Manager I



From Ashland to Paducah...

- **2,326,406** sqft. of building space
- **12,642** acres of training land
- **57** Armories & Readiness Centers
- **11** Field Maintenance Shops
- **4** Regional Maintenance Shops
- **3** Training Sites
 - Wendell H. Ford Regional Training Center
 - Harold L. Disney Training Site (Artemus)
 - Eastern Kentucky Training Site (Hidden Valley)



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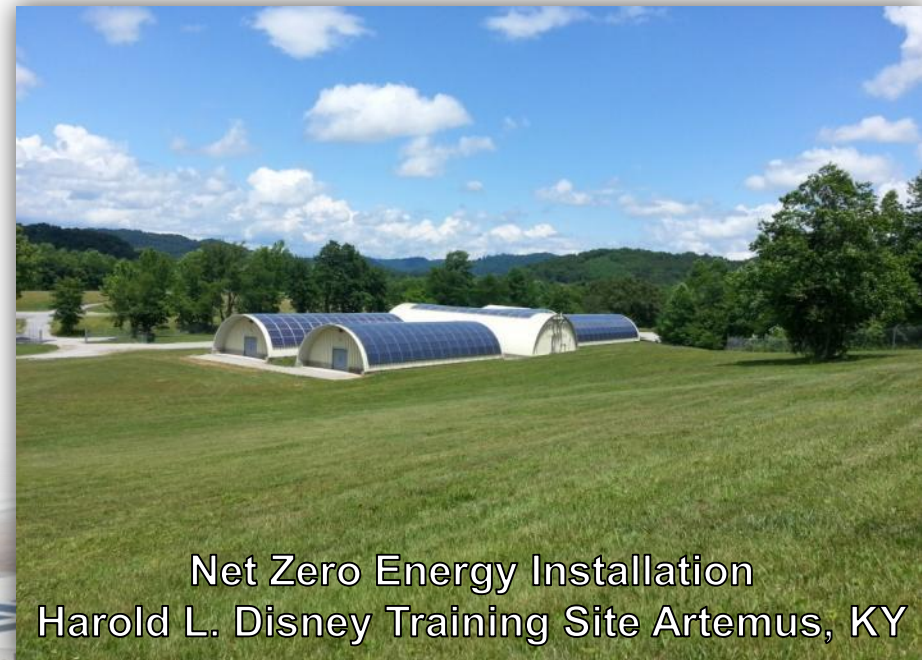
Renewable Energy Goals

- 10 USC §2911 (e) Energy Performance Goals & Master Plan for the Department of Defense
 - Goal of producing **25%** of facility energy with **renewable energy sources** by 2025.
- Executive Order 13423
 - Reduce **energy intensity by 3% annually**, leading to **30%** by the end of 2015.
 - **57.62%** decrease in Energy Use Index (EUI) from 2003 to 2014.



Renewable Energy Goals

- Executive Order 13514
 - Reduce **potable water intensity** by **2% annually**, leading to **26%** by the end of 2020.
- The Net Zero Initiative



Net Zero Energy Installation
Harold L. Disney Training Site Artemus, KY

Building Controls Strategy

- **KYARNG** facilities are integrated into a **web-based building automation systems**
 - Reporting, trending, scheduling, control
- Occupancy schedules and other building parameters are tuned to accurately match facility operation and maximize the benefit of energy consumed
- Advanced Metering Technology



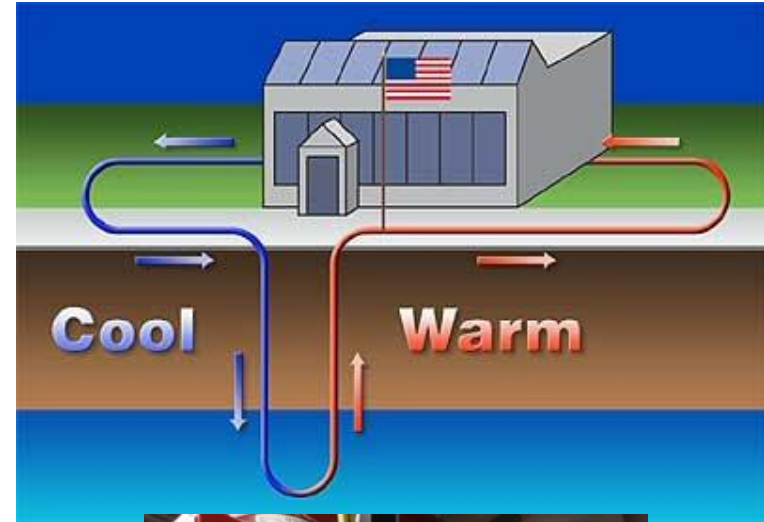
Integrating Sustainable Design

- Incorporating energy saving techniques during design such as:
 - Insulation & Durable Materials, Building Envelope
 - Building Orientation, Daylight Harvesting
 - Efficient HVAC & Ground Source Heat Pumps
 - Efficient lighting & Controls
 - Cool Roof Systems
- ANSI/ASHRAE/IESNA Standard 90.1 (2004)
- 200 KAR 6:070
- LEED Silver



Harnessing The Earth: Geothermal

- Facilities with GSHPs:
 - Richmond Armed Forces Reserve Readiness Center
 - Richmond Armory Expansion
 - Richmond Field Maintenance Shop
 - Morehead Readiness Center
 - Burlington Readiness Center
 - Harlan Armory
 - NEW Army Aviation Support Facility
 - 108 wells at 400ft deep
- **\$0.21/SF/Year in savings**

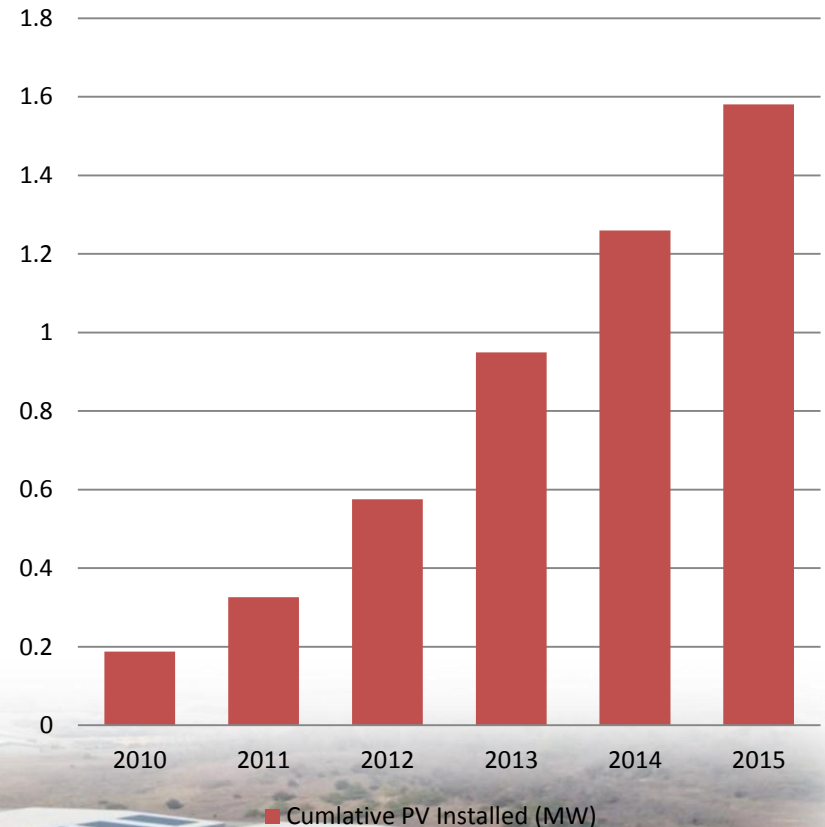


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Powered by the **SUN**

- In 2014, the **KYARNG** total solar production was **824,899 kWh**.
- Projected **1.5 MW** of PV installed by the end of 2015.
- Estimated **15%** of KYARNG total electric from PV by the end of 2015.

Cumulative Solar Installed (MW)





214 KW at Harold L. Disney
Training Site Artemus, KY



40.2 KW at Army Aviation
Support Facility Frankfort, KY



36 KW at US Property &
Fiscal Office Frankfort, KY



41 KW at Cynthiana Armory
Cynthiana, KY



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883.4 KW at Wendell H. Ford Regional
Training Center Greenville, KY



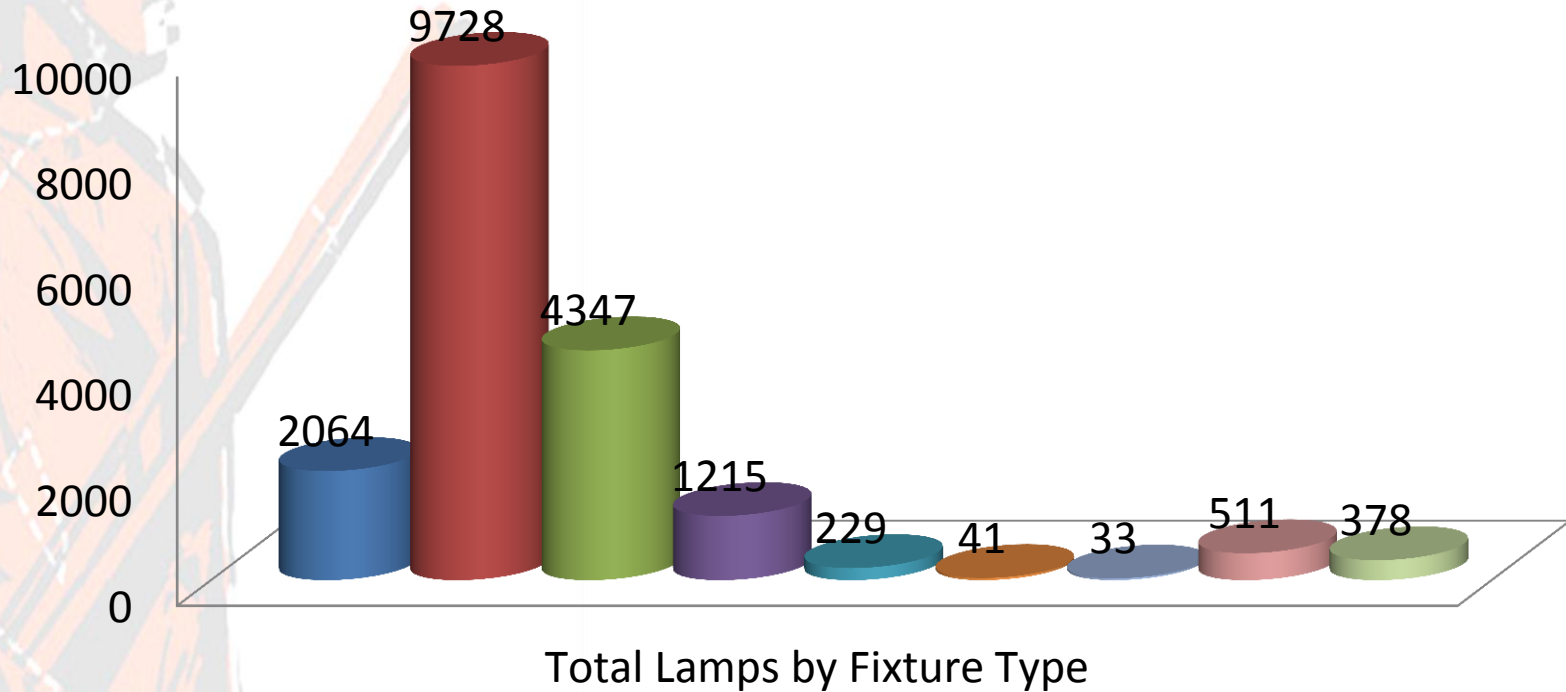
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Long Lasting Luminaries

- **Upgrades** of outdated luminaries serves as a simple method of **reducing energy consumption and maintenance costs.**
- LED luminaries
- Photo/motion sensors
- Daylight Harvesting



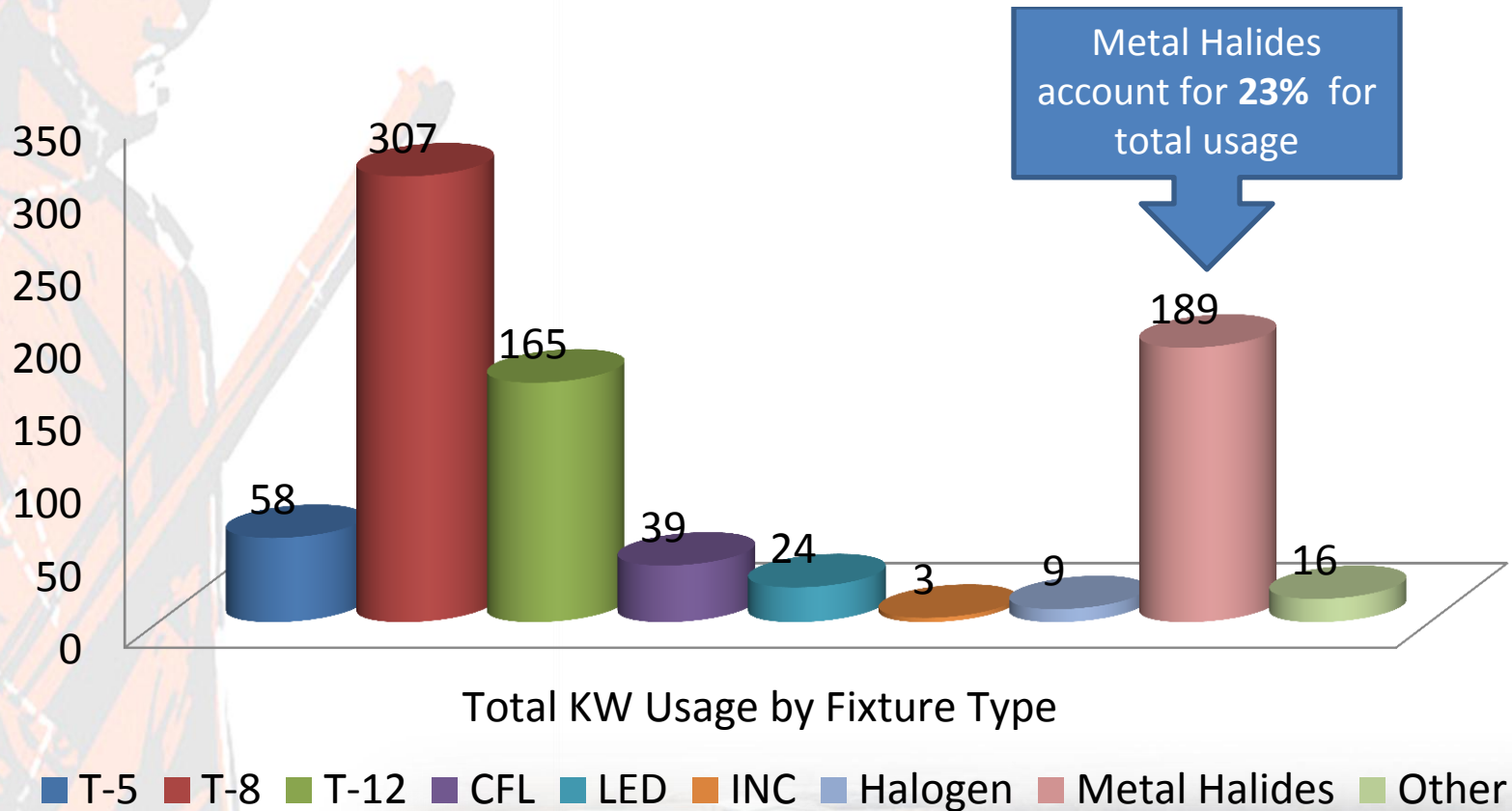
Total Lamps by Fixture Type



■ T-5 ■ T-8 ■ T-12 ■ CFL ■ LED ■ INC ■ Halogen ■ Metal Halides ■ Other



KW Usage by Fixture



Case Study: MATES, FT Knox



- The **KYARNG** has seen its largest reductions when pairing lighting upgrades, both interior and exterior, with the installation of solar photovoltaic systems



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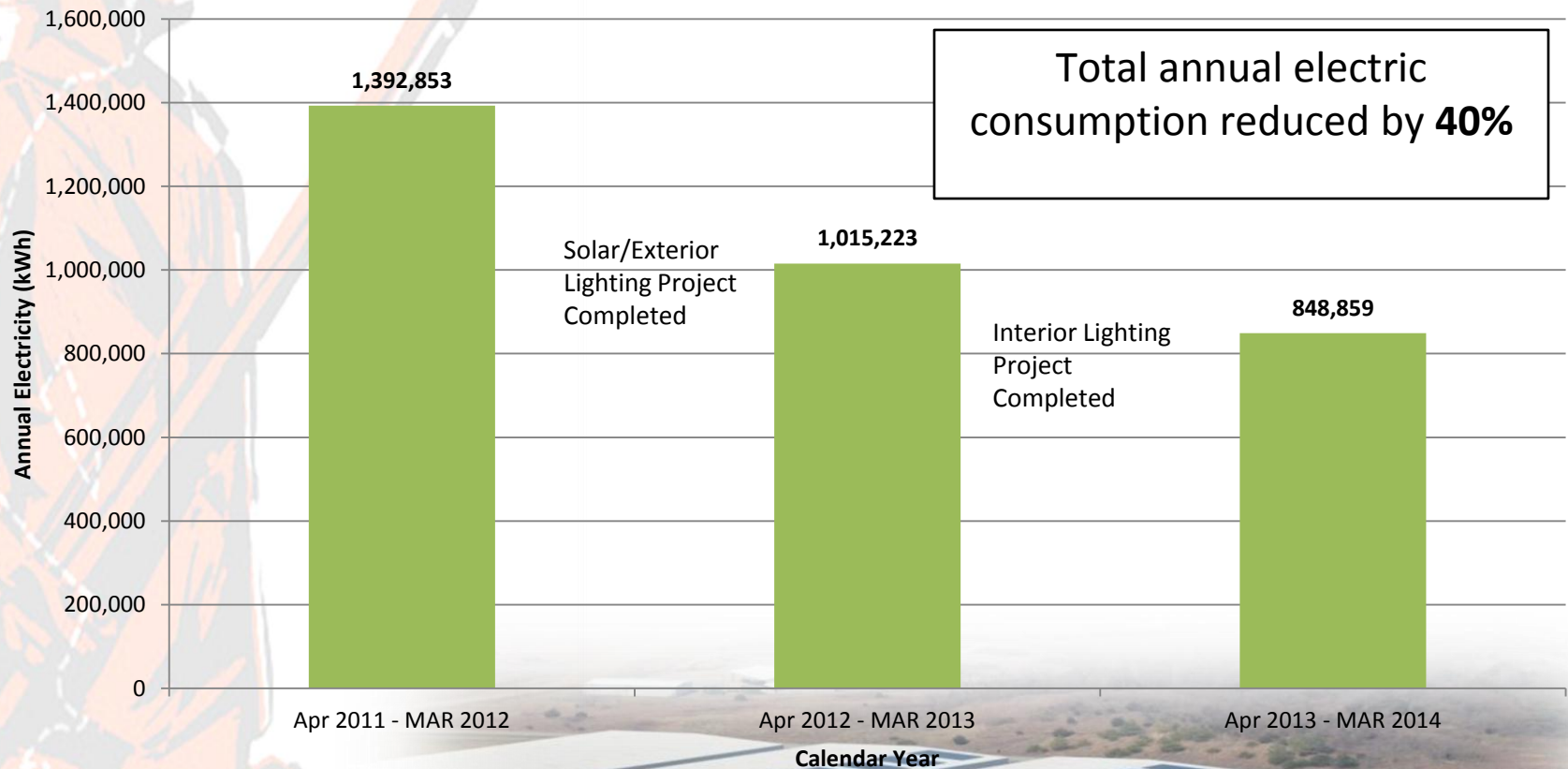
Case Study: MATES, FT Knox

- **Phase 1:** Upgrading Exterior Lights & PV Install
 - LEDs reduced demand by 79.6KW
 - 50 KW Solar
- **Phase 2:** Interior Lights & Controls
 - LEDs reduced demand by 17.9KW
 - 30 Daylight Harvesting sensors
 - Over 100 Occupancy sensors
- **Phase 3:** Recoverable Energy
 - De-stratification Fans
 - Used Oil Furnaces



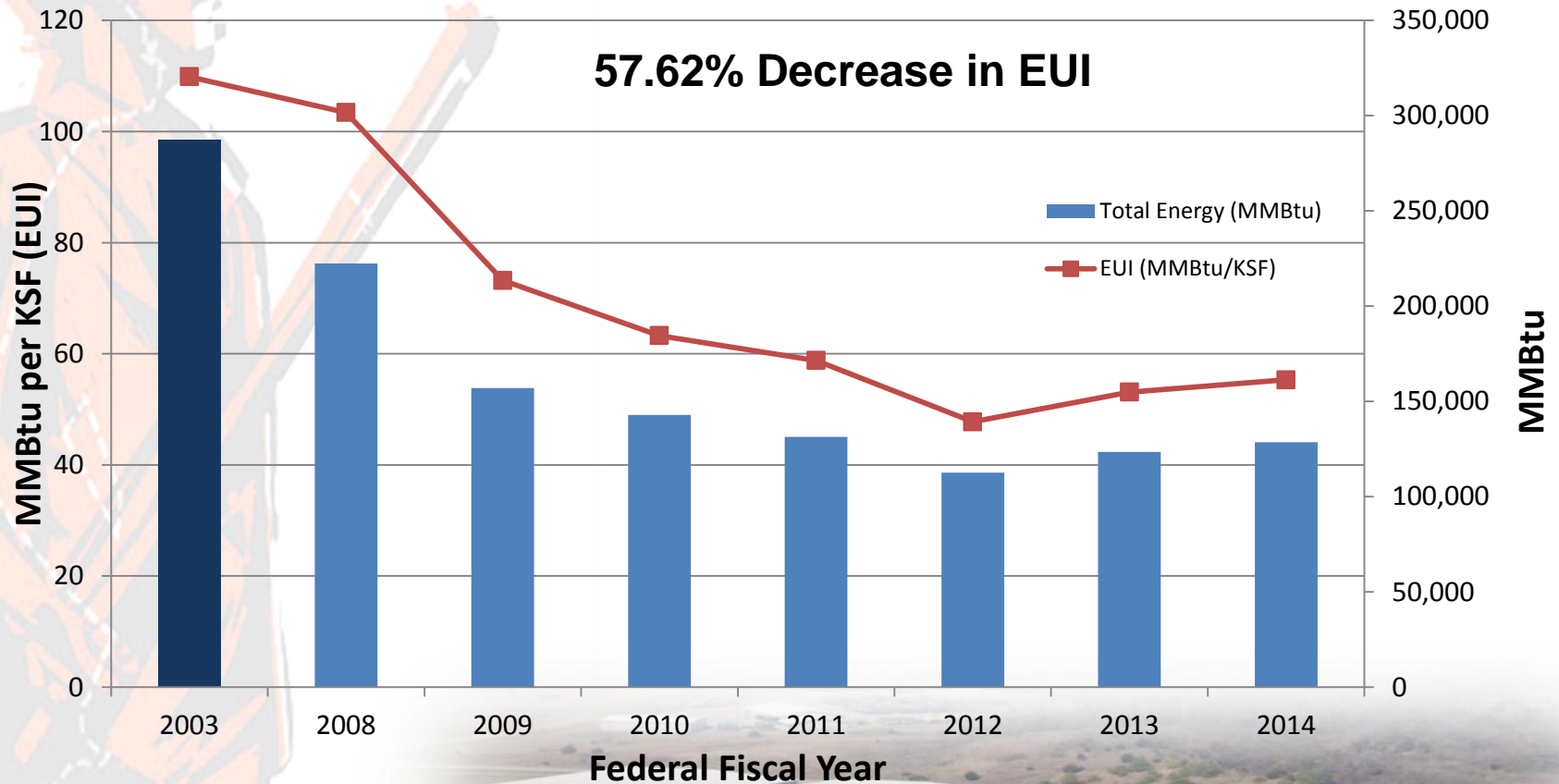
Case Study: MATES, FT Knox

FT. KNOX MATES FACILITY ELECTRIC USAGE



Signs of Progress

Kentucky Army National Guard Energy Usage Report



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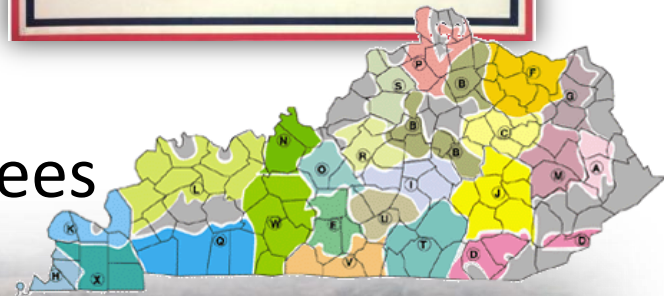
Challenges Ahead

- Rising Energy Costs
 - **\$0.047** per KWh in **2003**
 - **\$0.091** per KWh in **2014**
- In **2003**, KYARNG Energy Bill = **\$2,479,416**
- In **2014**, KYARNG Energy Bill = **\$2,431,393**
- **Without** Energy Savings Initiatives = **\$5,430,307**



Challenges Ahead

- Energy Awareness
 - Behavioral Modification
 - Changes in Attitude
- Multiple Distribution Co-ops
 - 33 Different Electric Providers
 - Multiple Gas & Water Providers
 - Multiple tariffs, regulations, & fees
 - Multiple rebates & incentives





QUESTIONS?



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